

PROCESS OF PREPARING LARGE DIMENSION EMULSION
POLYMER PARTICLES, POLYMER PRODUCT AND USES THEREOF

The invention relates to large dimension emulsion polymer particles, compositions containing the large dimension emulsion polymer particles and processes of manufacture.

Insert claim 1.

According to ~~a first aspect of~~ the present invention there is provided ~~a large~~ dimension emulsion polymer particle obtainable from an emulsion polymerization process comprising polymerizing at least one ethylenically unsaturated monomer in the presence of i) a stabilizer system containing from about 0.5 to 50 weight percent of primary amphiphilic polymeric stabilizer based on the total monomer reactants, and optional organic additive, in which the polymeric stabilizer is selected from the group consisting of hydrophobic-hydrophilic balanced alkaline soluble resin solubilized with organic or inorganic base and hydrophobic-hydrophilic balanced acid soluble resin solubilized by organic or inorganic acid, ii) a free-radical polymerization initiator; under conditions which favour the continued solubility of the primary amphiphilic polymeric stabilizer, and adding additional monomer in a controlled manner to cause the spherical particles to grow into stabilized large dimension emulsion particles, and optionally continuing to add monomer to cause the large dimension emulsion particles to grow.

~~According to a second aspect of the present invention there is provided a process for forming a large dimension emulsion polymer particle wherein the process is as defined in the first aspect of the present invention.~~ *also prepared by the above*

Further According to ~~a third~~ ³ aspect of the present invention there is provided a high aspect ratio emulsion polymer particle containing functional groups,

~~According to a fourth aspect of the present invention there is provided a crosslinked high aspect ratio polymer particle,~~ *2*

~~According to a fifth aspect of the present invention there is provided a high aspect ratio carbon particle,~~

~~According to a sixth aspect of the present invention there is provided a composition comprising large spherical particles,~~

~~According to a seventh aspect of the present invention there is provided the use of a large spherical particles as a reinforcing additive for coating, molding or potting compositions.~~

Preferably, the large dimension emulsion polymer particles are high aspect ratio emulsion polymer latexes.

Preferably, the large dimension emulsion polymer particles are spherical emulsion polymer particles of from 2 to 50 microns in diameter.

Preferably, the polymeric stabilizer is either an alkali-soluble resin containing from about 5 to about 75 weight percent acid-functional monomer and having a molecular weight greater than 1,000 or an acid-soluble resin containing from about 20 to about 70 weight percent alkali-functional monomer and having a molecular weight greater than 1,000.

Preferably, an organic additive is present and is selected from the group consisting of hydrophobic alcohols which contain from 6 to 18 carbon atoms, surfactants, polyvinyl alcohols and coalescent agent.

Preferably, the process comprises the step of adding to the prepared high aspect ratio polymer particle a solvent or additional monomer in an amount effective to swell the particle and to cause the high aspect ratio polymer to change its shape into a large spherical particle.

Preferably, in the high aspect ratio emulsion polymer particle the functional

Claims:

1. ~~A large dimension emulsion polymer particle obtainable from an~~
~~emulsion polymerization process comprising~~ *for preparing emulsion polymer particles,*

in an aqueous medium
 polymerizing at least one ethylenically unsaturated monomer in the presence of:

- i) ~~a stabilizer system containing~~ *about* from about 0.5 to 50 weight percent *of primary*
~~amphiphilic polymeric stabilizer~~ *substantially water-soluble* ~~based on the total monomer reactants~~ *and optional organic additive* and
~~optional organic additive, in which the polymeric stabilizer is selected from the~~
 group consisting of hydrophobic-hydrophilic balanced alkaline soluble resin,
~~solubilized with organic or inorganic base and hydrophobic-hydrophilic balanced~~
 acid soluble resin *solubilized by organic or inorganic acid*;
- ii)
- iii) a free-radical polymerization initiator;

~~under conditions which favour the continued solubility of the primary~~
 amphiphilic polymeric stabilizer, and adding additional monomer in a
 controlled manner to cause the spherical particles to grow into stabilized large
 dimension emulsion particles, and optionally continuing to add monomer to
 cause the large dimension emulsion particles to grow.

2. ~~A large dimension emulsion polymer particle according to claim 1~~
 wherein the large dimension emulsion polymer particles are high aspect ratio
 emulsion polymer latexes.

3. A large dimension emulsion polymer particle according to claim 1 or
 claim 2 wherein the large dimension emulsion polymer particles are spherical
 emulsion polymer particles of from 2 to 50 microns in diameter.

Amend remaining claims into line with
claims of US Patent No. 5,369,163.

4. A large dimension emulsion polymer particle according to any one of claims 1 to 3 wherein the polymeric stabilizer is either an alkali-soluble resin containing from about 5 to about 75 weight percent acid-functional monomer and having a molecular weight greater than 1,000 or an acid-soluble resin containing from about 20 to about 70 weight percent alkali-functional monomer and having a molecular weight greater than 1,000.

5. A large dimension emulsion polymer particle according to any one of claims 1 to 4 wherein an organic additive is present and is selected from the group consisting of hydrophobic alcohols which contain from 6 to 18 carbon atoms, surfactants, polyvinyl alcohols and coalescent agent.

6. A large dimension emulsion polymer particle according to any one of claims 1 to 5 wherein the process comprises the step of adding to the prepared high aspect ratio polymer particle a solvent or additional monomer in an amount effective to swell the particle and to cause the high aspect ratio polymer to change its shape into a large spherical particle.

7. A process for forming a large dimension emulsion polymer particle wherein the process is as defined in any one of claims 1 to 6.

8. A high aspect ratio emulsion polymer particle containing functional groups.

9. A high aspect ratio emulsion polymer particle according to claim 8 wherein the functional group is selected from the group consisting of amine, hydroxyl, acetoacetyl, N-alkanolamido, oxirane and acid.

10. A crosslinked high aspect ratio polymer particle.

11. A high aspect ratio carbon particle.

~~12. A high aspect ratio carbon particle according to claim 11 wherein the particle is formed from pyrolyzing a high aspect ratio polymer particle.~~

13. A composition comprising large spherical particles according to any one of claims 1 to 6 or prepared according to the process of claim 7.

14. A composition according to claim 13 further comprising a binder.

15. A composition according to claim 13 or claim 14 wherein the composition is any one of a coating with a pigment volume concentration near or above the critical pigment volume concentration having improved mud-cracking resistance on porous substrates comprising pigment, binder and high aspect ratio polymer particles; a joint cement and the particles are high aspect ratio particles; a thermoplastic molding composition; a thermoplastic molding composition wherein the particles are high aspect ratio particles; or a cementitious composition having improved flexural strength comprising inorganic materials, wherein the particles are high aspect ratio particles.

16. Use of a large spherical particles according to any one of claims 1 to 6 or prepared according to the process of claim 7 as a reinforcing additive for coating, molding or potting compositions.

17. An emulsion polymerization process as defined in claim 1 or any claim dependent thereon for forming a large dimension emulsion polymer particle.